[Time: Three Hours] **[Marks: 100]**

Please check whether you have got the right question paper

NB: 1.All questions are compulsory.
2. Answers to the same questions must be written together.
3. Figures to the right indicate full marks.
4. The use of log table/ non programmable calculator is allowed.

Q 1 (A) Select the correct option and complete the following statements **(Any twelve)** **(12)**

i) Which of the following rate law of reactant 'A' and 'B'is second order?
   a) Rate =k [A] $[B]^2$
   b) Rate = k[A] [B]
   c) Rate = k $[A]^2$ $[B]^2$

ii) The half life time of a second order reaction is _____ to the initial concentration.
   a) directly proportional
   b) independent
   c) inversely proportional

iii) The unit of rate constant of a first order reaction involves____.
   a) only time
   b) time and concentration
   c) time and square of concentration

iv) In general, the viscosity _____ with temperature.
   a) decreases b) increases c) remains the same

v) Increasing molecular mass of a liquid, the viscosity _____.
   a) increases b) decreases c) no effect

vi) Among the following _____ has maximum viscosity.
   a) water b) ethyl alcohol c) glycerine

vii) Outer electronic configuration of group 16 elements is _____.
   a) ns^2np^2 b) ns^2np^3 c) ns^2np^4

viii) Oxidation state of sulphur in H_2SO_4 is _____.
   a) +6 b) +5 c) –5

ix) Which one of the following best defines the word "allotropes"?
   a) Different structural forms of an element with same chemical properties.
   b) Elements that possess properties intermediate between those of metals and non-metals.
   c) The different phases (solid, liquid or gas) of a substance

x) Number of electrons in the valence shell of the O^{2-} ion are_____
   a) 2 b) 8 c) 10

xi) Which one of the following shows catenation property?
   a) Carbon b) Lithium c) Magnesium

xii) Among the following, _____ can cause global warming.
   a) H_2 b) O_2 c) CO_2

xiii) The isomer which rotates the plane of plane polarized light in clockwise direction is _____ isomer.
   a) laevo b) meso c)dextro

xiv) Molecule with one asymmetric carbon has _____optical isomers.
a) 2 b) 3 c) 4

xv) n- butane has _____ conformations due to rotations about C_2-C_3 bond.
a) 4 b) 6 c) 3

xvi) In Z-E nomenclature, if high priority groups are on the same side of the double bond , then the isomer is called as _____isomer.
a) Z b) E c) Z-E

xvii) Absolute configuration of (+)Tartaric acid can be detected using _____.
a) colorimeter b) polarimeter c) X-ray diffraction

xviii) The process of separating a racemic mixture into its component enantiomers is called _____.
a) resolution b) solvation c) desolution

(B) State whether the following statements are **True** or **False** (3)
(Any Three)

i) The rate constant of a reaction is the change in concentration of the any of the reactant per unit time.
ii) Poise is the S.I unit of Viscosity.
iii) Group 13 to 18 elements are known as s block elements.
iv) CO produces toxic effect on human being due to its irreversible reaction with haemoglobin in the blood.
v) Optical rotation is measured using polarimeter.
vi) Horizontal lines in Fischer projection formula represents bonds that project above the plane of paper.

(C) Match the following columns **(Any Five)** (5)

(i)	Example of a bimolecular reaction is	(a)	Argon
(ii)	Smectic liquid crystals-	(b)	optically inactive
(iii)	Noble gas	(c)	$2NO \longrightarrow N_2 + O_2$
(iv)	Peroxides	(d)	geometrical isomerism
(v)	Olefins	(e)	diamagnetic
(vi)	Racemic mixture	(f)	ethyl p-azoxy cinnamate
		(g)	paramagnetic
		(h)	$3NO \longrightarrow N_2O$
		(i)	optically active

Q. 2 Attempt any Four of the following

(A) Define i) order ii) molecularity iii) rate and iv) half life time of a reaction **(5)**

(B) A reaction A $\longrightarrow$ Products follows a first order reaction with **(5)**
$k = 2.0 \times 10^{-2}\ s^{-1}$.Calculate the concentration of A remaining after 100 seconds, if the initial concentration of A is 1.2 mol/L.

(C) Derive the integrated rate equation of a second order reaction having equal **(5)**
concentration of the reactants.

(D) Define Viscosity of a liquid. How is it determined using a Ostwald's viscometer? **(5)**

(E) In a Stalagmometer experiment, the same volume of organic liquid and water formed 30 and 25 drops respectively. If the surface tension of water is 7.2×10^{-2} Nm^{-1}. Calculate surface tension of organic liquid. The density of organic liquid is 0.85×10^3 kg m^{-3} and that of water is 1.0×10^3 kg m^{-3}. **(5)**

(F) What are Liquid Crystals ? Discuss the classification of liquid crystals. **(5)**

Q. 3 **Attempt any Four of the following**

(A) What is diagonal relationship between elements? Explain it with respect to beryllium and aluminium. **(5)**

(B) How does nitrogen differ from other group 15 elements? **(5)**

(C) How is sodium carbonate prepared? State any two each of its properties and uses. **(5)**

(D) Formulate the hydroxides of alkali metals and compare their basic strengths. **(5)**

(E) Give important applications of quick lime (any five). **(5)**

(F) What are carbides ? How are alkali metal carbides prepared? **(5)**

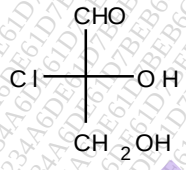
Q. 4 **Attempt any Four of the following**

(A) Explain the terms with suitable examples: **(5)**
a)Threo isomer b) Erythro isomer

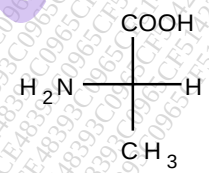
(B) i) Distinguish between Enantiomers and Diastereoisomers. **(3)**

ii) Assign R or S descriptors **(2)**

a)



b)



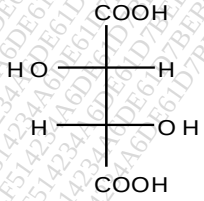
(C) i) Give the structures of the following **(2)**
a) D – glyceraldehyde
b) Cis -2 butene

ii) Identify chiral and achiral molecules **(3)**
a) CH_3CHBr_2
b) $CH_3CH(OH)Br$
c) $C_2H_5CH(Cl)CH_3$

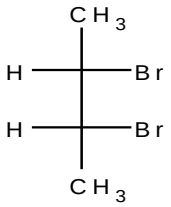
(D) Draw the conformations of n-Butane for rotation about C_1-C_2 bond and discuss their relative stabilities. **(5)**

(E) Convert the following molecules from Fisher projection formula to Sawhorse formula. **(5)**

a)



b)



(F) i) What are the characteristics of Meso isomers? **(3)**

ii) Discuss the causes of geometrical isomerism **(2)**

Q 5 **Attempt any Four of the following**

(A)	Explain how Graphical method is used to determine the first order and second order of a reaction.	**(5)**
(B)	What do you mean by an optically active compound? The refractive index of a liquid at 25^0C is 1.6 and its density is 0.87 g cm^{-3}. Find the molar refraction of the liquid. (Molecular mass of the liquid is 78).	**(5)**
(C)	Name any two oxides of Carbon. Write any two sources and control measures for each oxides of carbon.	**(5)**
(D)	Write a brief note on Acid Rain.	**(5)**
(E)	What is conformational analysis? Draw the various conformations of Ethane using Saw horse and Newman projection formula.	**(5)**
(F)	Explain optical isomerism in Lactic acid.	**(5)**